CERTIFICATION OF TRANSLATION

I, ***Moung-kyo Kim***, an employee of Y.P. LEE, MOCK & PARTNERS of Koryo Building, 1575-1 Seocho-dong, Seocho-gu, Seoul, Republic of Korea 137-875, hereby declare under penalty of perjury that I understand the Korean language and the English language; that I am fully capable of translating from Korean to English and vice versa; and that, to the best of my knowledge and belief, the statement in the English language in the attached translation of ***Korean Patent Application No. 10-2003-007442*** consisting of 27 pages, have the same meanings as the statements in the Korean language in the original document, a copy of which I have examined.

Signed this 17th day of May 2006

Moung kyo Kim

ABSTRACT

[Abstract of the Disclosure]

A screen having a wide viewing angle and a projection television including the screen are provided. The screen includes a Fresnel lens sheet for converting incident light into near-parallel light, a lenticular lens sheet including a horizontal array of vertical cylindrical lenses for horizontally emitting light output from the Fresnel lens sheet, in which vertical black stripes are formed in parallel on connection portions for the cylindrical lenses, and a light diffusion film including a vertical array of horizontal cylindrical lenses for vertically emitting light output from the lenticular lens sheet, in which horizontal black stripes are formed in parallel on connection portions for the cylindrical lenses. In particular, the screen has a wide vertical viewing angle and a high contrast ratio, thereby providing a high definition image.

[Representative Drawing]

FIG. 3

SPECIFICATION

[Title of the Invention]

WIDE VIEWING ANGLE SCREEN AND PROJECTION TELEVISION COMPRISING THE SAME

[Brief Description of the Drawings]

FIG. 1 is a schematic exploded perspective view of a conventional screen;

FIG. 2 is a graph showing light distribution according to a viewing angle in a conventional screen;

FIG. 3 is an exploded perspective view of a screen according to a first embodiment of the present invention;

FIG. 4 is an exploded perspective view of a screen according to a second embodiment of the present invention;

FIG. 5A is a plan view of the screen of FIG. 3;

FIG. 5B is a side view of the screen of FIG. 3;

FIG. 6 is a schematic structural view of a projection television according to an embodiment of the present invention; and

FIG. 7 is a graph showing brightness with respect to a vertical viewing angle according to an embodiment of the present invention.

<Explanation of Reference numerals designating the Major elements of the Drawings>

30: screen	31: Fresnel lens sheet
33: lenticular lens sheet	35: light diffusion film
37: protective filter	100: projection television
101: illuminating optical system	103: image optical system
105: projection optical system	

[Detailed Description of the Invention]

[Object of the Invention]

[Technical Field of the Invention and Related Art prior to the Invention]

The present invention relates to a screen and a projection television comprising the screen. More particularly, the present invention relates to a screen having a wide viewing angle and a projection television comprising the screen.

With increasing screen sizes of displays, studies about displays providing good image quality regardless of the positions of viewers, i.e., viewing angles have been done.

FIG. 1 is a schematic exploded perspective view of a conventional projection screen. Referring to FIG. 1, a conventional projection screen comprises a Fresnel lens sheet 11 converting light emitted from an image source into parallel light, a horizontal lenticular lens sheet 13 disposed on the front surface of the Fresnel lens sheet 11 and comprising vertical cylindrical lenses 12 arranged in a horizontal direction to emit light in a horizontal direction, and a protective filter 15 transmitting light output from the lenticular lens sheet 13 and protecting the lenticular lens sheet 13. Here, black stripes 14 are positioned on protrusions for connection of the cylindrical lenses 12, which is formed at an exit face of the horizontal lenticular lens sheet 13. The black stripes serve to absorb light output from the protrusions and to block external light, thereby increasing a contrast ratio.

A conventional projection screen can provide a wide horizontal viewing angle. However, a relatively narrow vertical viewing angle is provided.

FIG. 2 is a graph showing the intensity of light finally output from the conventional projection screen shown in FIG. 1 according to a viewing angle of a viewer. Here, f0 represents light distribution according to a horizontal viewing angle in the absence of a lenticular lens sheet, f1 represents light distribution according to a vertical viewing angle in the presence of a lenticular lens sheet, and f2 represents light distribution according to a horizontal viewing angle in the presence of a lenticular lens sheet. Referring to FIG. 2, with respect to a viewing angle distribution having light intensity corresponding to a half of the maximal light intensity, f0 has a standard viewing angle distribution θ_O, f2 has a wide horizontal viewing angle distribution θ_H, and f1 has a narrow vertical viewing angle distribution θ_V.

Conventionally, in order to increase a vertical viewing angle, a light-diffusing agent is incorporated into a lenticular lens sheet. Alternatively, a vertical lenticular lens sheet having a vertical array of horizontal cylindrical lenses can be further used, like in a rear projection screen disclosed in Korean Patent Laid-Open Publication No. 2000-15228.

However, since the light-diffusing agent is used in a large amount, using the light-diffusing agent increases diffusion of light, thereby increasing loss of light amount. On the other hand, using the vertical lenticular lens sheet can slightly increase a vertical viewing angle. However, while light passes through two lenticular lens sheets, loss of light increases due to reflection or diffusion, thereby lowering brightness and contrast ratio. In addition, conventionally, a vertical lenticular lens sheet is formed on a surface of a Fresnel lens sheet or is separately formed, thereby increasing a process burden.

[Technical Goal of the Invention]

The present invention provides a screen that can provide a wide vertical viewing angle and a high contrast ratio and a projection television comprising the screen.

[Structure and Operation of the Invention]

According to an aspect of the present invention, there is provided a screen comprising: a Fresnel lens sheet for converting incident light into near-parallel light; a lenticular lens sheet comprising a horizontal array of vertical cylindrical lenses for horizontally emitting light output from the Fresnel lens sheet, in which vertical black stripes are formed in parallel on connection portions for the cylindrical lenses; and a light diffusion film comprising a vertical array of horizontal cylindrical lenses for vertically emitting light output from the lenticular lens sheet, in which horizontal black stripes are formed in parallel on connection portions for the cylindrical lenses.

The lenticular lens sheet may contain a light-diffusing agent.

According to another aspect of the present invention, there is provided a screen comprising: a Fresnel lens sheet for converting incident light into near-parallel light; a

light diffusion film comprising a vertical array of horizontal cylindrical lenses for vertically emitting light output from the Fresnel lens sheet, in which horizontal black stripes are formed in parallel on connection portions for the cylindrical lenses; and a lenticular lens sheet comprising a horizontal array of vertical cylindrical lenses for horizontally emitting light output from the light diffusion film, in which vertical black stripes are formed in parallel on connection portions for the cylindrical lenses.

The lenticular lens sheet may contain a light-diffusing agent.

According to specific embodiments of the two screens of the present invention, each of the cylindrical lenses of the light diffusion film may have a spherical or non-spherical entrance face and a flat exit face.

The light diffusion film may be a film with high light transmittance, for example, made of polyethylene terephthalate (PET) or polycarbonate (PC). The black stripes of the light diffusion film may be formed using a photolithography process.

Each of the cylindrical lenses of the lenticular lens sheet may have a spherical or non-spherical face. Each of the cylindrical lenses of the lenticular lens sheet may have a spherical or non-spherical entrance face and a spherical or non-spherical exit face, and the entrance face and the exit face may have different curvatures.

The screen may further comprise a protective filter disposed on a projection light path of the lenticular lens sheet to protect the screen. The protective filter may be coated with an anti-reflective material. The protective filter may be laminated on the light diffusion film.

According to another aspect of the present invention, there is provided a projection television comprising: an illuminating optical system for generating light; an image optical system for converting light output from the illuminating optical system into an image according to an applied image signal; a projection optical system for projecting the image; and a screen for displaying an image created by light projected from the projection optical system, the screen comprising: a Fresnel lens sheet for converting incident light into near-parallel light; a lenticular lens sheet comprising a horizontal array of vertical cylindrical lenses for horizontally emitting light output from the

Fresnel lens sheet, in which vertical black stripes are formed in parallel on connection portions for the cylindrical lenses; and a light diffusion film comprising a vertical array of horizontal cylindrical lenses for vertically emitting light output from the lenticular lens sheet, in which horizontal black stripes are formed in parallel on connection portions for the cylindrical lenses.

The lenticular lens sheet may contain a light-diffusing agent.

According to yet another aspect of the present invention, there is provided a projection television comprising: an illuminating optical system for generating light; an image optical system for converting light output from the illuminating optical system into an image according to an applied image signal; a projection optical system for projecting the image; and a screen for displaying an image created by light projected from the projection optical system, the screen comprising: a Fresnel lens sheet for converting incident light into near-parallel light; a light diffusion film comprising a vertical array of horizontal cylindrical lenses for vertically emitting light output from the Fresnel lens sheet, in which horizontal black stripes are formed in parallel on connection portions for the cylindrical lenses; and a lenticular lens sheet comprising a horizontal array of vertical cylindrical lenses for horizontally emitting light output from the light diffusion film, in which vertical black stripes are formed in parallel on connection portions for the cylindrical lenses.

The lenticular lens sheet may contain a light-diffusing agent.

According to specific embodiments of the two projection televisions of the present invention, each of the cylindrical lenses of the light diffusion film may have a spherical or non-spherical entrance face and a flat exit face.

The light diffusion film may be a film with high light transmittance, for example, made of PET or PC. The black stripes of the light diffusion film may be formed using a photolithography process.

Each of the cylindrical lenses of the lenticular lens sheet may have a spherical or non-spherical face. Each of the cylindrical lenses of the lenticular lens sheet may have

a spherical or non-spherical entrance face and a spherical or non-spherical exit face, and the entrance face and the exit face may have different curvatures.

The screen may further comprise a protective filter disposed on a projection light path of the lenticular lens sheet to protect the screen. The protective filter may be coated with an anti-reflective material. The protective filter may be laminated on the light diffusion film.

According to the present invention, the light diffusion film comprises a vertical array of horizontal cylindrical lenses and horizontal black stripes formed on connection portions for the cylindrical lenses. The light diffusion film is disposed between the Fresnel lens sheet and the lenticular lens sheet or between the lenticular lens sheet and the protective filter. Therefore, a wide vertical viewing angle and a high contrast ratio can be ensured.

Hereinafter, a screen and a projection television comprising the screen according to the present invention will be described in detail with reference to the accompanying drawings.

FIGS. 3 and 4 are schematic exploded perspective views of screens according to first and second embodiments of the present invention, respectively.

Referring to FIG. 3, a screen according to the first embodiment of the present invention comprises a Fresnel lens sheet 31 for converting light emitted from an image source (not shown) into near-parallel light, a lenticular lens sheet 33 for emitting light output from the Fresnel lens sheet 31 in left and right directions, i.e., in a horizontal direction, to widen a horizontal viewing angle, a light diffusion film 35 for emitting light output from the lenticular lens sheet 33 in top and bottom directions, i.e., in a vertical direction, to widen a vertical viewing angle, and a protective filter 37 disposed on a projection light path of the light diffusion film 35 to protect the entire surface of the screen.

Preferably, the Fresnel lens sheet 31 has Fresnel grooves formed by coating a UV curable resin on a polymethyl methacrylate (PMMA) substrate. The Fresnel

grooves are formed at a predetermined pitch and create a multi-focus to control a viewing distance.

The lenticular lens sheet 33 is positioned on a projection light path of the Fresnel lens sheet 31. The lenticular lens sheet 33 comprises a horizontal (x-axis direction) array of a plurality of vertical (y-axis direction) cylindrical lenses 33a. Therefore, the lenticular lens sheet 33 horizontally emits near-parallel light output from the Fresnel lens sheet 31, thereby widening a horizontal viewing angle and reducing a color shift. Here, the curvatures of the entrance faces of the cylindrical lenses 33a may be different from those of the exit faces of the cylindrical lenses 33a.

The exit face of the lenticular lens sheet 33 comprises a horizontal array of protrusions connecting the cylindrical lenses 33a. Black stripes 33b are formed on the upper surfaces of the protrusions to block external light and to absorb some light output after diffused from the lenticular lens sheet 33. Here, the black stripes 33b are formed at a predetermined ratio to the entire area of the lenticular lens sheet 33 to thereby adjust brightness and contrast appropriately. Preferably, the lenticular lens sheet 33 contains a light-diffusing agent to increase diffusion of light output from the Fresnel lens sheet 31.

The light diffusion film 35 is disposed on a projection light path of the lenticular lens sheet 33 to vertically emit light output from the lenticular lens sheet 33, thereby widening a vertical viewing angle. The light diffusion film 35 comprises a vertical array of hemicylindrical lenses 35a having spherical or non-spherical faces of a predetermined curvature on a base film. The hemicylindrical lenses 35a are arranged to be perpendicular to the array direction of the cylindrical lenses 33a constituting the lenticular lens sheet 33. The exit face of the light diffusion film 35 comprises black stripes 35b to prevent a contrast reduction. Preferably, the hemicylindrical lenses 35a of the light diffusion film 35 have a predetermined pitch so that Moire interference does not occur between the light diffusion film 35 and the Fresnel lens sheet 31.

The black stripes 35b can be formed by an ink printing method. Preferably, the black stripes 35b are formed by a photolithography process. That is, a high

transmissive film such as polyethylene terephthalate (PET) film or a polycarbonate (PC) film is formed on the exit face of the light diffusion film 35 and a photoresist is then deposited on the transmissive film. When horizontal light enters into the entrance face of the light diffusion film 35, the light is refracted by the hemicylindrical lenses 35a. As a result, some areas of the photoresist are exposed to the light. When the exposed areas are removed using a developing solution, the transmissive film remains only on unexposed areas, as shown in FIG. 3. When ink is absorbed in the transmissive film-containing areas, the black stripes are formed. The areas and positions of the black stripes 35b can vary depending on the characteristics of the Fresnel lens sheet and the lenticular lens sheet. The photolithography process makes it possible to easily adjust the areas of the black stripes 35b according to desired optical characteristics.

Preferably, a screen according to the first embodiment of the present invention further comprises the protective filter 37 adjacent to the light diffusion film for protecting an external surface of the screen. For this, the protective filter 37 may be coated with an antistatic material and a material for preventing the formation of external scratch. Further, the protective filter 37 may be coated with an antireflective material several times, or alternatively with an anti-glare material to induce a diffuse reflection.

For the sake of simplifying a screen fabrication process, the protective filter 37 may be laminated on the light diffusion film 35. The lamination process can be carried out using an adhesive, but is not limited thereto. The lamination process can provide strengths enough to prevent the bending and deformation of the light diffusion film 35 and can prevent the formation of micro-folds at the light diffusion film 35, thereby enhancing image quality.

FIG. 4 is a schematic exploded perspective view of a screen according to the second embodiment of the present invention. Unlike in FIG. 3, a light diffusion film 45 is disposed between a Fresnel lens sheet 41 and a lenticular lens sheet 43.

The structures and functions of the Fresnel lens sheet 41, the light diffusion film 45, the lenticular lens sheet 43, and a protective film 47 are as described above. The

light diffusion film 45 may contain a light-diffusing agent to increase the diffusion and emission of light output from the light diffusion film 45.

The structures of the light diffusion film 45 and the lenticular lens sheet 43 are not limited to those as mentioned above. It must be noted that the shapes of the light diffusion film 45 and the lenticular lens sheet 43 may be changed with each other. The light diffusion film 45 may be formed only on some areas of the lenticular lens sheet 43. Black stripes may be formed in various shapes such as circular or polygonal shapes.

FIGS. 5A and 5B are respectively schematic plan and side views of the screen according to the first embodiment of the present invention as shown in FIG. 3.

Referring to FIG. 5A, light emitted from the Fresnel lens sheet 31 is reflected and converted into near-parallel light. Incident light of the lenticular lens sheet 33 is reflected at the entrance faces 33ai of the cylindrical lenses and then emitted in a horizontal direction from the exit faces 33ao of the cylindrical lenses. When viewed from a top of the screen, it appears that light goes straight continuously without being reflected through the light diffusion film 35 and the protective filter 37 until it reaches a viewer.

Referring to FIG. 5B, when viewed from a side of the screen, light passing through the lenticular lens sheet 33 appears to go straight. Light output from the Fresnel lens sheet 31 is inputted into the light diffusion film 35 via the lenticular lens sheet 33. Light is reflected at the entrance faces 35ai of the cylindrical lenses of the light diffusion film 35. Light output from the exit faces 35ao of the cylindrical lenses of the light diffusion film 35 is emitted in a vertical direction and then passes through the protective filter 37 without being reflected, as shown in FIG. 5B.

FIG. 6 is a schematic structural view of a projection television according to an embodiment of the present invention.

Referring to FIG. 6, a projection television 100 according to an embodiment of the present invention comprises a screen 30 disposed at the front surface of a housing 109, an illuminating optical system 101 disposed in the housing 109 and having a light source, an image optical system 103 for modulating light output from the illuminating

optical system 101 according to an image signal, a projection optical system 105 for magnifying light output from the image optical system 103 to be projected onto the screen 30, and a mirror 107 for reflecting light output from the projection optical system 105 to be projected onto the screen 30. The mirror 107 can change a light path, thereby decreasing the size of the projection television.

One of the screens according to the first and second embodiments of the present invention as shown in FIG. 3A and 3B is used as the screen 30 of the projection television 100 according to an embodiment of the present invention.

FIG. 7 is a graph showing brightness distribution with respect to a vertical viewing angle in a conventional projection television f1 that has a common screen and in a projection television f2 that has the screen according to the first embodiment of the present invention. Here, in the projection television according to the present invention, a monochromatic cathode ray tube (CRT) is used as an image source. A Fresnel lens sheet comprises red, green, and blue light lenses formed by UV curing on a PMMA substrate and having a pitch of 0.068 mm. A lenticular lens sheet comprises black stripes formed by extrusion of PMMA and having a pitch of 0.52 mm. The black stripes occupy 45% of the entire area of the lenticular lens sheet. A light diffusion film comprises an array of cylindrical lenses having a pitch of 0.155 mm on a PET base film. Black stripes of the light diffusion film occupy 60% of the entire area of the light diffusion film. A protective film is coated with an anti-glare material.

Referring to FIG. 7, in graph f1, as a vertical viewing angle increases, brightness greatly decreases. In particular, at more than 6 degrees, brightness is rapidly reduced to less than 50% (cd/m^2). On the other hand, in graph f2, brightness distribution remains constant independent of vertical viewing angles. That is, it can be seen that a projection television comprising a screen according to the present invention provides uniform light diffusion distribution at a wide viewing angle.

While the present invention has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without

departing from the spirit and scope of the present invention as defined by the following claims.

[Effect of the Invention]

As is apparent from the above description, a screen according to the present invention provides wide vertical and horizontal viewing angles and a high contrast ratio, thereby producing a high performance, high definition projection television.

What is claimed is:

1. A screen comprising:

a Fresnel lens sheet for converting incident light into near-parallel light;

a lenticular lens sheet comprising a horizontal array of vertical cylindrical lenses for horizontally emitting light output from the Fresnel lens sheet, in which vertical black stripes are formed in parallel on connection portions for the cylindrical lenses; and

a light diffusion film comprising a vertical array of horizontal cylindrical lenses for vertically emitting light output from the lenticular lens sheet, in which horizontal black stripes are formed in parallel on connection portions for the cylindrical lenses.

2. The screen according to claim 1, wherein each of the cylindrical lenses of the light diffusion film has a spherical entrance face and a flat exit face.

3. The screen according to claim 1, wherein each of the cylindrical lenses of the light diffusion film has a non-spherical entrance face and a flat exit face.

4. The screen according to claim 1, wherein the light diffusion film is a film with high light transmittance.

5. The screen according to claim 4, wherein the light diffusion film is made of polyethylene terephthalate (PET) or polycarbonate (PC).

6. The screen according to claim 1, wherein the black stripes of the light diffusion film are formed using a photolithography process.

7. The screen according to claim 1, wherein each of the cylindrical lenses of the lenticular lens sheet has a spherical face.

8. The screen according to claim 1, wherein each of the cylindrical lenses of

the lenticular lens sheet has a non-spherical face.

9. The screen according to claim 1, wherein each of the cylindrical lenses of the lenticular lens sheet has a spherical entrance face and a spherical exit face of different curvatures.

10. The screen according to claim 1, wherein each of the cylindrical lenses of the lenticular lens sheet has a spherical entrance face and a non-spherical exit face of different curvatures.

11. The screen according to claim 1, wherein each of the cylindrical lenses of the lenticular lens sheet has a non-spherical entrance face and a spherical exit face of different curvatures.

12. The screen according to claim 1, wherein each of the cylindrical lenses of the lenticular lens sheet has a non-spherical entrance face and a non-spherical exit face of different curvatures.

13. The screen according to claim 1, wherein the lenticular lens sheet contains a light-diffusing agent.

14. The screen according to claim 1, further comprising a protective filter disposed on a projection light path of the lenticular lens sheet to protect the screen.

15. The screen according to claim 1, wherein the protective filter is coated with an anti-reflective material.

16. The screen according to claim 1, wherein the protective filter is laminated on the light diffusion film.

17. A screen comprising:

a Fresnel lens sheet for converting incident light into near-parallel light;

a light diffusion film comprising a vertical array of horizontal cylindrical lenses for vertically emitting light output from the Fresnel lens sheet, in which horizontal black stripes are formed in parallel on connection portions for the cylindrical lenses; and

a lenticular lens sheet comprising a horizontal array of vertical cylindrical lenses for horizontally emitting light output from the light diffusion film, in which vertical black stripes are formed in parallel on connection portions for the cylindrical lenses.

18. The screen according to claim 17, wherein each of the cylindrical lenses of the light diffusion film has a spherical entrance face and a flat exit face.

19. The screen according to claim 17, wherein each of the cylindrical lenses of the light diffusion film has a non-spherical entrance face and a flat exit face.

20. The screen according to claim 17, wherein the light diffusion film is a film with high light transmittance.

21. The screen according to claim 20, wherein the light diffusion film is made of PET or PC.

22. The screen according to claim 17, wherein the black stripes of the light diffusion film are formed using a photolithography process.

23. The screen according to claim 17, wherein each of the cylindrical lenses of the lenticular lens sheet has a spherical face.

24. The screen according to claim 17, wherein each of the cylindrical lenses of

the lenticular lens sheet has a non-spherical face.

25. The screen according to claim 17, wherein each of the cylindrical lenses of the lenticular lens sheet has a spherical entrance face and a spherical exit face of different curvatures.

26. The screen according to claim 17, wherein each of the cylindrical lenses of the lenticular lens sheet has a spherical entrance face and a non-spherical exit face of different curvatures.

27. The screen according to claim 17, wherein each of the cylindrical lenses of the lenticular lens sheet has a non-spherical entrance face and a spherical exit face of different curvatures.

28. The screen according to claim 17, wherein each of the cylindrical lenses of the lenticular lens sheet has a non-spherical entrance face and a non-spherical exit face of different curvatures.

29. The screen according to claim 17, wherein the lenticular lens sheet contains a light-diffusing agent.

30. The screen according to claim 17, further comprising a protective filter disposed on a projection light path of the lenticular lens sheet to protect the screen.

31. The screen according to claim 17, wherein the protective filter is coated with an anti-reflective material.

32. The screen according to claim 17, wherein the protective filter is laminated on the light diffusion film.

33. A projection television comprising:

an illuminating optical system for generating light;

an image optical system for converting light output from the illuminating optical system into an image according to an applied image signal;

a projection optical system for projecting the image; and

a screen for displaying an image created by light projected from the projection optical system, the screen comprising: a Fresnel lens sheet for converting incident light into near-parallel light; a lenticular lens sheet comprising a horizontal array of vertical cylindrical lenses for horizontally emitting light output from the Fresnel lens sheet, in which vertical black stripes are formed in parallel on connection portions for the cylindrical lenses; and a light diffusion film comprising a vertical array of horizontal cylindrical lenses for vertically emitting light output from the lenticular lens sheet, in which horizontal black stripes are formed in parallel on connection portions for the cylindrical lenses.

34. The projection television according to claim 33, wherein each of the cylindrical lenses of the light diffusion film has a spherical entrance face and a flat exit face.

35. The projection television according to claim 33, wherein each of the cylindrical lenses of the light diffusion film has a non-spherical entrance face and a flat exit face.

36. The projection television according to claim 33, wherein the light diffusion film is a film with high light transmittance.

37. The projection television according to claim 36, wherein the light diffusion film is made of PET or PC.

38. The projection television according to claim 33, wherein the black stripes of the light diffusion film are formed using a photolithography process.

39. The projection television according to claim 33, wherein each of the cylindrical lenses of the lenticular lens sheet has a spherical face.

40. The projection television according to claim 33, wherein each of the cylindrical lenses of the lenticular lens sheet has a non-spherical face.

41. The projection television according to claim 33, wherein each of the cylindrical lenses of the lenticular lens sheet has a spherical entrance face and a spherical exit face of different curvatures.

42. The projection television according to claim 33, wherein each of the cylindrical lenses of the lenticular lens sheet has a non-spherical entrance face and a spherical exit face of different curvatures.

43. The projection television according to claim 33, wherein each of the cylindrical lenses of the lenticular lens sheet has a spherical entrance face and a non-spherical exit face of different curvatures.

44. The projection television according to claim 33, wherein each of the cylindrical lenses of the lenticular lens sheet has a non-spherical entrance face and a non-spherical exit face of different curvatures.

45. The projection television according to claim 33, wherein the lenticular lens sheet contains a light-diffusing agent.

46. The projection television according to claim 33, further comprising a protective filter disposed on a projection light path of the lenticular lens sheet to protect the screen.

47. The projection television according to claim 33, wherein the protective filter is coated with an anti-reflective material.

48. The projection television according to claim 47, wherein the protective filter is laminated on the light diffusion film.

49. A projection television comprising:

an illuminating optical system for generating light;

an image optical system for converting light output from the illuminating optical system into an image according to an applied image signal;

a projection optical system for projecting the image; and

a screen for displaying an image created by light projected from the projection optical system, the screen comprising: a Fresnel lens sheet for converting incident light into near-parallel light; a light diffusion film comprising a vertical array of horizontal cylindrical lenses for vertically emitting light output from the Fresnel lens sheet, in which horizontal black stripes are formed in parallel on connection portions for the cylindrical lenses; and a lenticular lens sheet comprising a horizontal array of vertical cylindrical lenses for horizontally emitting light output from the light diffusion film, in which vertical black stripes are formed in parallel on connection portions for the cylindrical lenses.

50. The projection television according to claim 49, wherein each of the cylindrical lenses of the light diffusion film has a spherical entrance face and a flat exit face.

51. The projection television according to claim 49, wherein each of the

cylindrical lenses of the light diffusion film has a non-spherical entrance face and a flat exit face.

52. The projection television according to claim 49, wherein the light diffusion film is a film with high light transmittance.

53. The projection television according to claim 52, wherein the light diffusion film is made of PET or PC.

54. The projection television according to claim 49, wherein the black stripes of the light diffusion film are formed using a photolithography process.

55. The projection television according to claim 49, wherein each of the cylindrical lenses of the lenticular lens sheet has a spherical face.

56. The projection television according to claim 49, wherein each of the cylindrical lenses of the lenticular lens sheet has a non-spherical face.

57. The projection television according to claim 49, wherein each of the cylindrical lenses of the lenticular lens sheet has a spherical entrance face and a spherical exit face of different curvatures.

58. The projection television according to claim 49, wherein each of the cylindrical lenses of the lenticular lens sheet has a spherical entrance face and a non-spherical exit face of different curvatures.

59. The projection television according to claim 49, wherein each of the cylindrical lenses of the lenticular lens sheet has a non-spherical entrance face and a spherical exit face of different curvatures.

60. The projection television according to claim 49, wherein each of the cylindrical lenses of the lenticular lens sheet has a non-spherical entrance face and a non-spherical exit face of different curvatures.

61. The projection television according to claim 49, wherein the lenticular lens sheet contains a light-diffusing agent.

62. The projection television according to claim 49, further comprising a protective filter disposed on a projection light path of the lenticular lens sheet to protect the screen.

63. The projection television according to claim 49, wherein the protective filter is coated with an anti-reflective material.

64. The projection television according to claim 49, wherein the protective filter is laminated on the light diffusion film.

FIG. 1

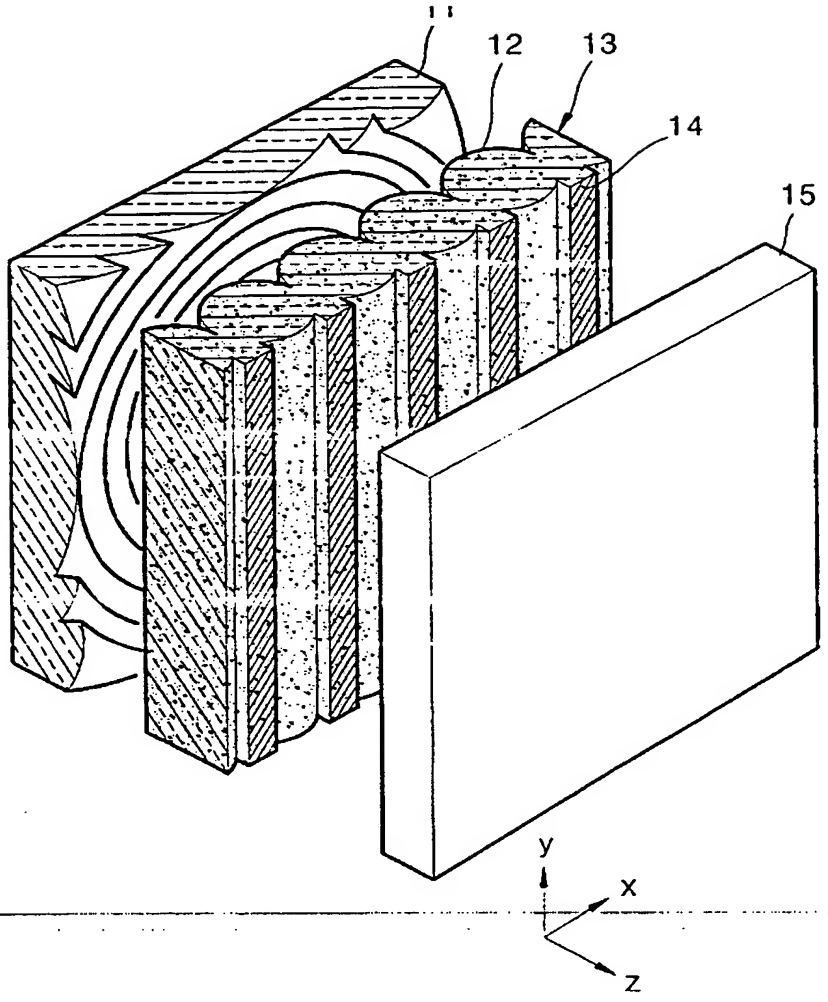

FIG. 2

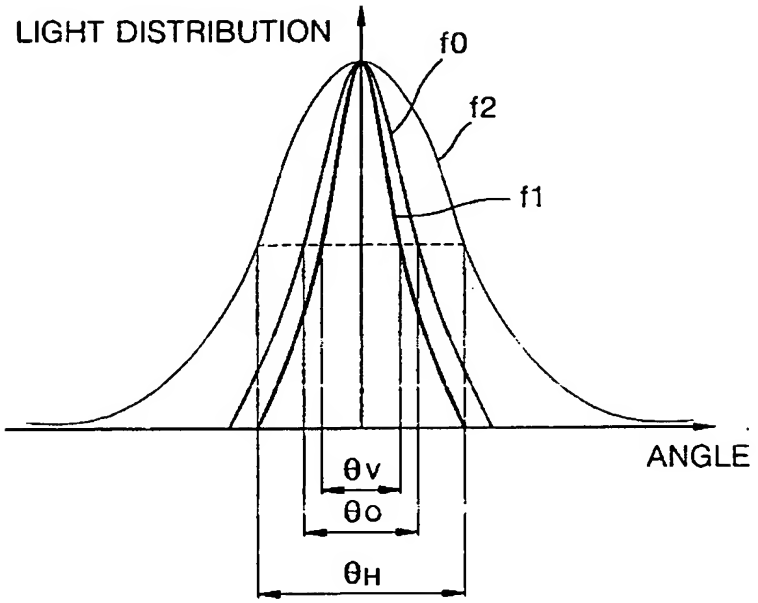

FIG. 3

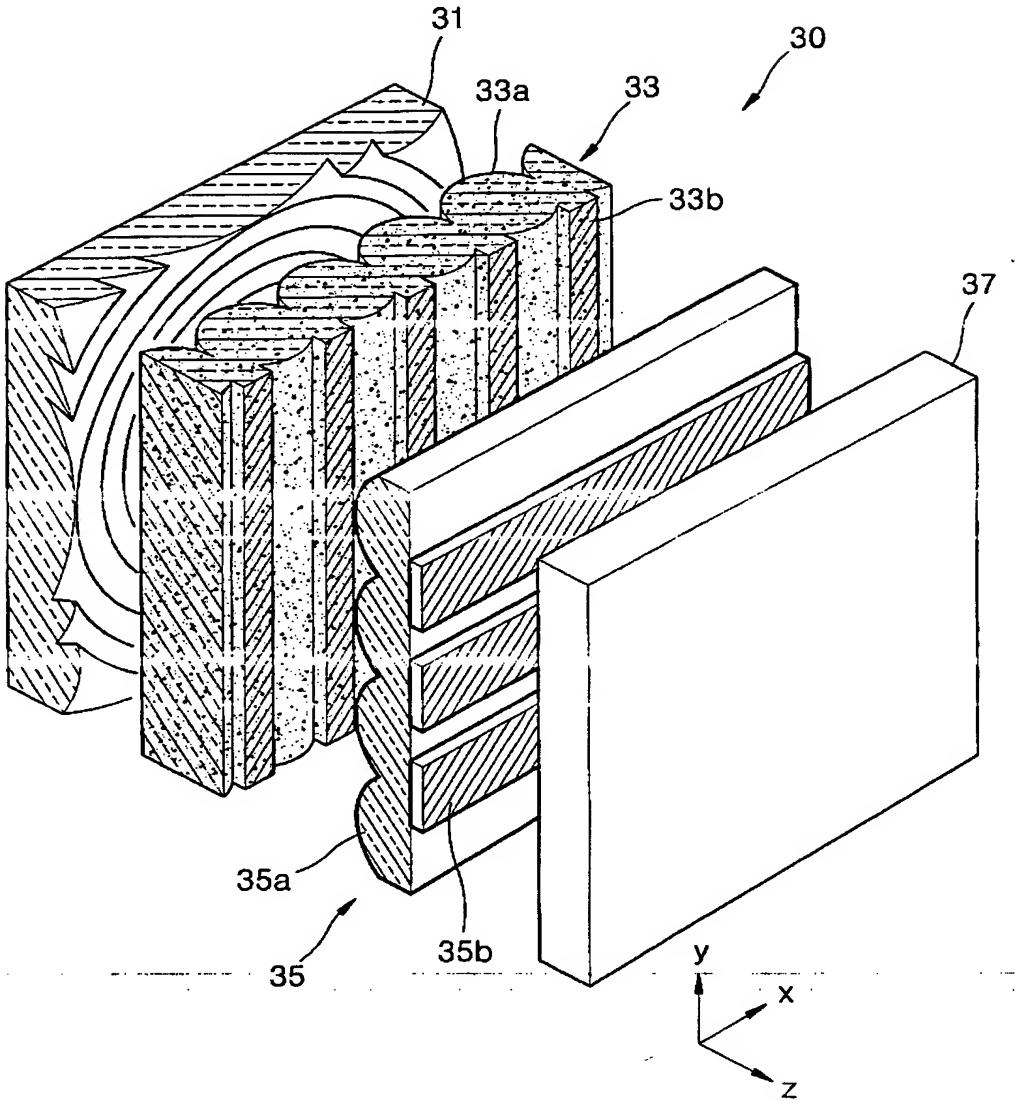

FIG. 4

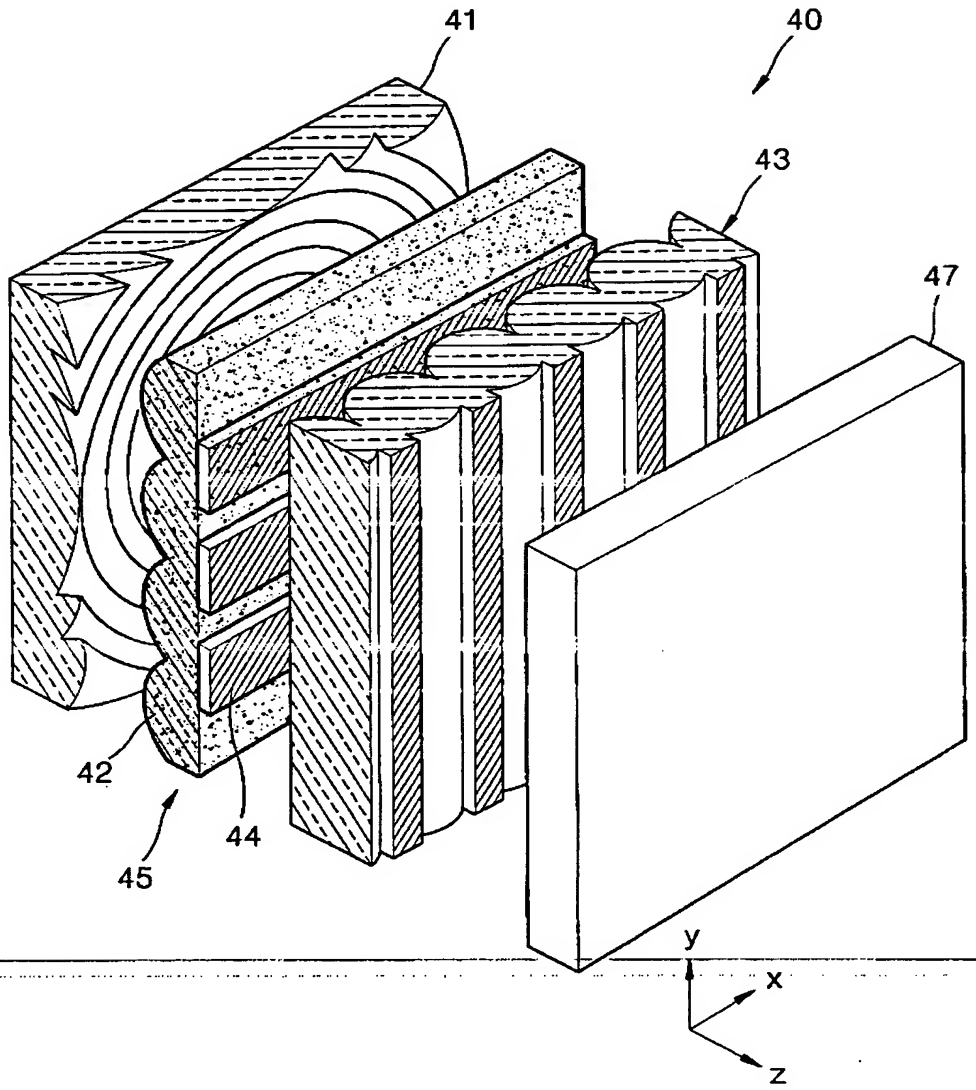

FIG. 5A

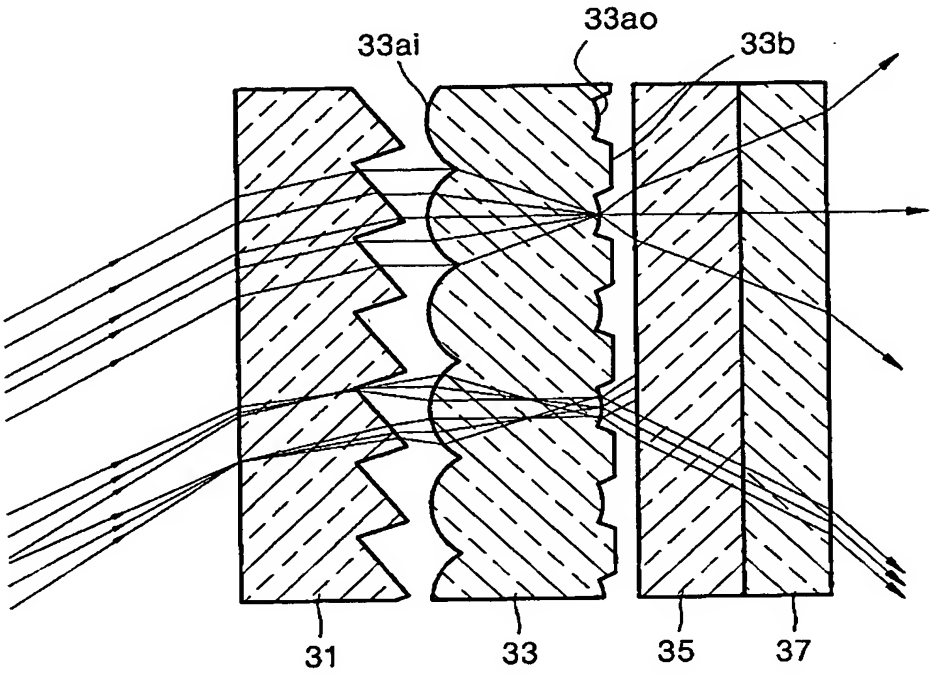

FIG. 5B

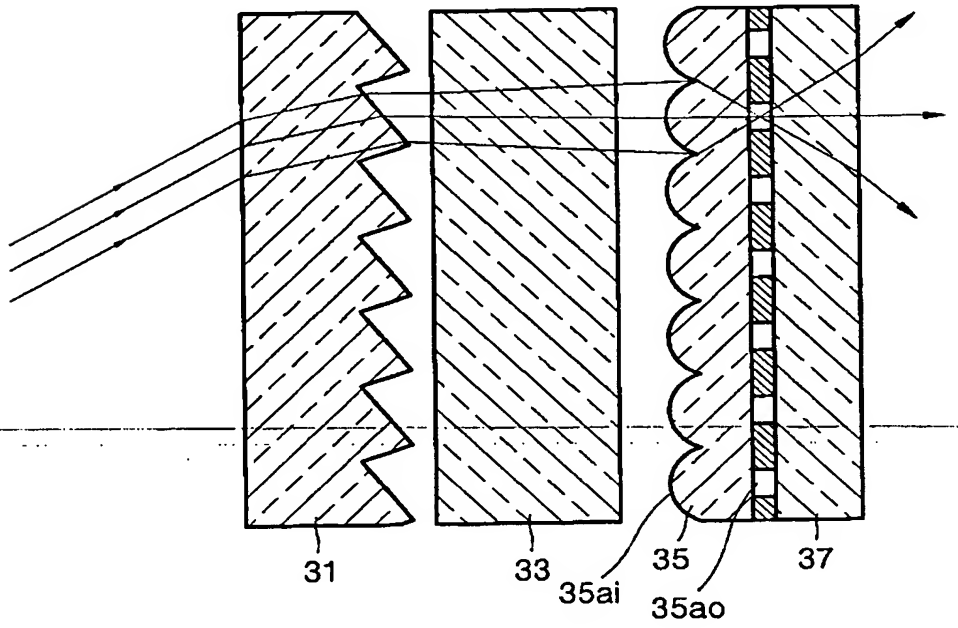

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FIG. 6

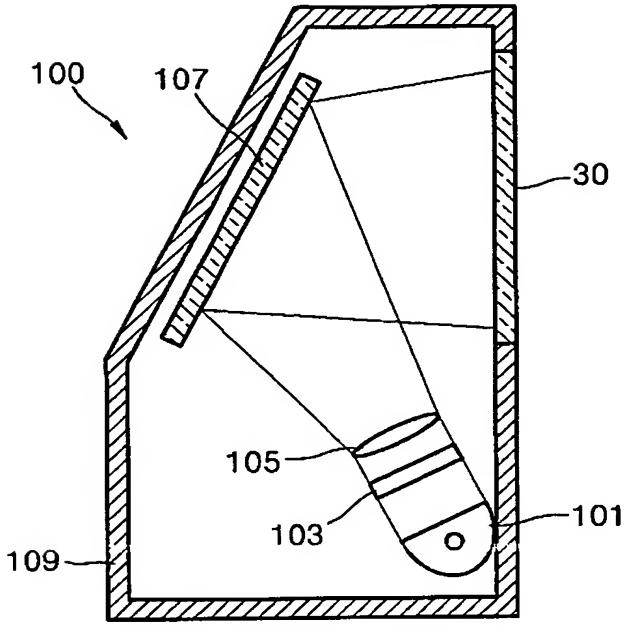

FIG. 7